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ABSTRACT

LARGE AREA SILICON CONE ARRAYS FABRICATION AND CONE
BASED NANOSTRUCTURE MODIFICATION

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A method and an apparatus have been developed to fabricate large area uniform silicon cone arrays using different kinds of ion-beam sputtering methods. The apparatus includes silicon substrate as the silicon source, and metal foils are used as catalyst. Methods of surface modification of the as-synthesized silicon cones for field emission application have also been developed, including hydrofluoric acid etching, annealing and low work-function metal coating. Nano-structure modification based on silicon cones takes advantage of the fact that the cone tip consists of metal/metal silicide, which can be used as catalyst and template for nanowires growth. A method and an apparatus have been developed to grow silicon oxide/silicon nanowires on tips of the silicon cones.

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